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Atty Docket No.: 10011548-1
App. Ser. No.: 10/076,635

<u>IN THE CLAIMS:</u>

Please find a listing of the claims below, with the statuses of the claims shown in parentheses. This listing will replace all prior versions, and listings, of claims in the present application.

1. (Currently amended) A ~~computer-implemented~~ method <u>of using a computer processor</u> to design a <u>physical</u> layout for an Internet Datacenter (IDC) cooling, <u>wherein the IDC comprises a plurality of components, said method</u> comprising:

~~defining~~ <u>modeling</u>, in [[a]]<u>the</u> computer, the <u>components of the</u> IDC as a collection of cells;

~~pre-characterizing~~ <u>assigning one or more characteristics to each</u> of the cells ~~of the IDC~~;

<u>assigning one or more constraints to each of the cells;</u>

determining an arrangement of the cells within the IDC; [[and]]

determining a profile for one or more <u>of the</u> parameters of interest for each cell<u>; and</u>

<u>using the computer processor to design a physical layout of the IDC cooling based on the determined profile, to thereby model conditions within the IDC to stay within the determined profile.</u>

2. (Original) The method of claim 1, wherein the parameters of interest of a cell include one or more of a maximum temperature, noise, electromagnetic interference, cost, and air flow rate.

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3. (Currently amended) The method of claim 1, wherein the step of ~~defining~~ modeling the IDC includes ~~one-or-more-of~~ modeling ~~components-of-the-IDC-as-the collection-of-cells, wherein~~ each of the cells [[is]] as one of a global and a local type of cell;

~~assigning characteristics-to-each-of-the-cells; and~~

~~assigning constraints-to-each-of-the-cells.~~

4. (Currently amended) The method of claim [[3]]1, wherein:

the one or more characteristics include one or more of a server type, vent tile pitch, orientation, ceiling plenum, floor plenum, and air conditioning; and

the one or more constraints include one or more of placement constraints, upgrade restraints, and dependencies.

5. (Currently amended) The method of claim [[3]]1, wherein the step of modeling components includes sizing the cells such that interaction between local cells is negligible in a simulation.

6. (Currently amended) The method of claim 1, ~~wherein-the-step-of-pre-characterizing-the-IDC-comprises-one-or-more-of~~ further comprising:

generating a look-up table of coefficients of the one or more parameters of interest for each cell; and

generating a fitting formula of coefficients of the one or more parameters of interest for each cell.

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7. (Currently amended) The method of claim 6, ~~wherein~~ further comprising using

computational flow dynamics ~~is used~~ to generate one or more of the look-up table and the

fitting formula.

8. (Original) The method of claim 6, wherein the step of determining the profile for

one or more parameters of interest for each cell includes determining one or more values

corresponding to each of the one or more parameters of interest for each cell.

9. (Original) The method of claim 8, wherein the one or more values of the

parameters of interest are determined for each cell based on one or more of:

   the cell arrangement;

   the look-up table of coefficients;

   the fitting formula of coefficients; and

   the characteristics of the cell.

10. (Currently amended) The method of claim 9, wherein the one or more

characteristics include at least one of a server type, vent tile pitch, orientation, ceiling

plenum, floor plenum, and air conditioning.

11. (Currently amended) The method of claim 9, ~~wherein~~ further comprising:

   using a multiple regression equation ~~is used~~ to determine the one or more values of the

parameters of interest for each cell.

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12. (Currently amended) The method of claim 1, further comprising one or more of:

calculating costs based on the profiles of one or more parameters of interest of the cells; and

verifying a solution from the step of determining the profile.

13. (Original) The method of claim 12, wherein the calculated cost is measured in one or more of money, power consumption, server density, usability, and efficiency.

14. (Currently amended) The method of claim 12, wherein the step of verifying the solution includes using computational flow dynamics simulation.

15. (Original) The method of claim 1, further including iterating one or more times through the steps of:

calculating costs based on the profiles of one or more parameters of interest of the cells;

optimizing the cell arrangement based on the results of the calculating step;

determining the arrangement of cells based on the optimizing step; and

determining the profile for the one or more parameters of interest.

16. (Currently amended) The method of claim 15, wherein the step of optimizing solution the cell arrangement includes using at least one of genetic algorithm, simulated annealing algorithm, threshold acceptance algorithm, branch and bound algorithm, and gradient-descent algorithm to optimize the cell arrangement.

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17. (Currently amended) A computerized system to design a physical layout for Internet Datacenter (IDC) cooling, wherein the IDC comprises a plurality of components, said system comprising:

a definition module stored in the computerized system configured to define model the components of the IDC as a collection of cells and to assign one or more constraints to each of the cells, wherein the modeling and the one or more constraints are stored as data on the computer;

a pre- characterization module configured to generate pre-characterization information of the cells of the IDC to a coefficient table stored as data on the computer;

an arrangement module configured to determine an arrangement of the cells within the IDC; [[and]]

a profiler module configured to determine a profile for one or more parameters of interest for each cell based on the pre-characterization information from the coefficient table; and

a main module configured to design, on the computerized system, a physical layout of the IDC cooling based on the determined profile, to thereby model conditions within the IDC to stay within the determined profile.

18. (Original) The system of claim 17, wherein the parameters of interest of a cell include one or more of a maximum temperature, noise, electromagnetic interference, cost, and air flow rate.

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19. (Currently amended) The system of claim 17, wherein the definition module is further configured to:

model components-of-the-IDC-as-the-collection-of-cells, wherein each of the cells [[is]] as one of a global and a local type of cell;

assign-characteristics-to-each-of-the-cells; and

assign-constraints-to-each-of-the-cells.

20. (Currently amended) The system of claim [[19]]17, wherein:

the one or more characteristics include one or more of a server type, vent tile pitch, orientation, ceiling plenum, floor plenum, and air conditioning; and

the one or more constraints include one or more of placement constraints, upgrade restraints, and dependencies.

21. (Currently amended) The system of claim [[19]]17, wherein the definition module is further configured to model the sizes of the cells such that interaction between local cells is negligible in a simulation.

22. (Original) The system of claim 17, wherein the pre- characterization module comprises:

a computational flow dynamics (CFD) interface module configured to interface with an external source of CFD data;

a look-up table / fitting formulation generation module configured to generate one or more of a look-up table of coefficients and a fitting formula of the one or more parameters of

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interest for each cell; and

    a coordinator module configured to coordinate activities of the CFD interface module

and the look-up table / fitting formula generator module and to write the one or more of the

look-up table of coefficients and the fitting formula of the one or more parameters to the

coefficient table.

    23. (Currently amended) The system of claim 22, wherein the profiler module is

further configured to determine one or more values corresponding to each of the one or more

parameters of interest for each cell based on the pre-characterization information from the

coefficient table.

    24. (Original) The system of claim 23, wherein the one or more values of the

parameters of interest are determined for each cell based on one or more of:

    the cell arrangement;

    the look-up table of coefficients;

    the fitting formula of coefficients; and

    one or more characteristics of the cell.

    25. (Currently amended) The system of claim 24, wherein the one or more

characteristics include one or more of a server type, vent tile pitch, orientation, ceiling

plenum, floor plenum, and air conditioning.

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26. (Currently amended) The system of claim 17, further comprising one or more of:

a cost calculate module for calculating costs based on the profiles of one or more

parameters of interest of the cells; and

a verifier module for verifying a solution from the profiler module.

27. (Currently amended) The system of claim 26, wherein the cost calculate module

is configured to calculate calculates cost measured in one or more of money, power

consumption, server density, usability, and efficiency.

28. (Previously presented) The system of claim 26, wherein the verifier module is

configured to use a computational flow dynamics simulation to verify the solution.

29. (Currently amended) The system of claim 26, further comprising:

an optimizer module configured to optimize the solution based on results reached by

the cost calculate module.

30. (Currently amended) The system of claim 29, wherein the optimizer module

utilizes at least one of a genetic algorithm, a simulated annealing algorithm, a threshold

acceptance algorithm, a branch and bound algorithm, and a gradient-descent algorithm to

optimize the solution.

31. (Original) The system of claim 29, wherein the arrangement module is further

configured to arrange cells of the IDC based on results of the optimizer module.

32. (Currently amended) A computerized system for designing a physical layout for

Internet Datacenter (IDC) cooling, wherein the IDC comprises a plurality of components,

said system comprising:

means to define model, in the computerized system, the components of the IDC as a

collection of cells;

means to pre-characterize assign one or more characteristics to each of the cells of the

IDC;

means to assign one or more constraints to each of the cells;

means to determine an arrangement of the cells within the IDC; [[and]]

means to determine a profile for one or more parameters of interest for each cell; and

means to design, on the computerized system, a physical layout of the IDC cooling

based on the profile determined by the means to determine a profile, to thereby model

conditions within the IDC to stay within the determined profile.

33. (Currently amended) The system of claim 32, wherein the means to define model

includes:

means to model components of the IDC as the collection of cells, wherein each of the

cells [[is]] as one of a global and a local type;

means-to-assign-characteristics-to-each-of-the-cells;-and

means-to-assign-constraints-to-each-of-the-cells.

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34. (Currently amended) The system of claim 33, wherein the means to ~~define~~ model further includes means to configure the sizes of the cells such that interaction between local cells is negligible in a simulation.

35. (Currently amended) The system of claim 32, further comprising one or more of

means to calculate costs based on the profiles of one or more parameters of interest of the cells; and

means to verify a solution from the means to profile.

36. (Currently amended) The system of claim [[32]]35, further comprising:

means to optimize the solution based on results reached by the means to calculate.

37. (Currently amended) The system of claim 36, wherein the means to optimize utilizes at least one of genetic algorithm, simulated annealing algorithm, threshold acceptance algorithm, branch and bound algorithm, and gradient-descent algorithm to optimize the solution.

38. (Currently amended) The system of claim 37, wherein the means to ~~determine an arrangement~~ design is configured to arrange cells of the IDC based on ~~results~~ the optimized solution of the means to optimize.

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39. (New) A computer readable storage medium on which is embedded one or more computer programs, said one or more computer programs implementing a method for using a computer processor to design a physical layout for an Internet Datacenter (IDC) cooling, wherein the IDC comprises a plurality of components, said one or more computer programs comprising a set of instructions for:

modeling, in the computer, the components of the IDC as a collection of cells;

assigning one or more characteristics to each of the cells;

determining an arrangement of the cells within the IDC;

determining a profile for one or more of the parameters of interest for each cell based upon the one or more characteristics and the arrangement of the cells;

assigning one or more constraints to each of the cells; and

using the computer processor to design a physical layout of the IDC cooling based on the assigned one or more constraints and the determined profile for each cell, such that IDC cooling is arranged to model conditions within the IDC to stay within the assigned one or more constraints and the determined profile of each cell.

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